

RECORD COPY PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

PCT/FI 97 / 00293

International Application No.

20 MAY

1997 (20.05.97)

International Filing Date

The Finnish Patent Office

PCT International Application

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference

(if desired) (12 characters maximum) 43133/PCT/sa

Box No. I TITLE OF INVENTION

Transmitting subscriber identity in mobile communication system

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)

NOKIA TELECOMMUNICATIONS OY
Keilalahdentie 4
FIN-02150 Espoo
Finland

This person is also inventor.

Telephone No.

Faximile No.

Teleprinter No.

State (i.e. country) of nationality:
FI

State (i.e. country) of residence:
FI

This person is applicant all designated States all designated States except the United States of America the United States of America only the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)

HUOTARI Seppo
Harakankuja 6 E 33
FIN-02600 Espoo
Finland

This person is:

applicant only

applicant and inventor

inventor only (If this check-box is marked, do not fill in below.)

State (i.e. country) of nationality:
FI

State (i.e. country) of residence:
FI

This person is applicant all designated States all designated States except the United States of America the United States of America only the States indicated in the Supplemental Box

Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

agent

common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

Telephone No.

358-9-618821

Faximile No.

358-9-602244

Teleprinter No.

122323 KOPAT FI

Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

See Notes to the request form

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- AP ARIPO Patent: KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|--|--|
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> IS Iceland | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakstan | |
| <input checked="" type="checkbox"/> LC Saint Lucia | |
| <input checked="" type="checkbox"/> LK Sri Lanka | |
| <input checked="" type="checkbox"/> LR Liberia | |
| <input checked="" type="checkbox"/> LS Lesotho | |
| <input checked="" type="checkbox"/> LT Lithuania | |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- YU Yugoslavia
- GH Ghana
-
-

In addition to the designations made above, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except the designation(s) of _____

The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

See Notes to the request form

| Box No. VI PRIORITY CLAIM | | Further priority claims are indicated in the Supplemental Box <input type="checkbox"/> | |
|---|---------------------------------|--|--|
| The priority of the following earlier application(s) is hereby claimed: | | | |
| Country (in which, or for which, the application was filed) | Filing Date (day/month/year) | Application No. | Office of filing (only for regional or international application) |
| item (1) FI | (20.05.1996) 20 May 1996 | 962128 | |
| item (2) | | | |
| item (3) | | | |

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s): _____

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): ISA / SE

Earlier search Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request:

Country (or regional Office): _____ Date (day/month/year): _____ Number: _____

Box No. VIII CHECK LIST

| | |
|---|--|
| This international application contains the following number of sheets: | This international application is accompanied by the item(s) marked below: |
| 1. request : 3 sheets 2. description : 6 sheets 3. claims : 2 sheets 4. abstract : 1 sheets 5. drawings : 2 sheets Total : 14 sheets | 1. <input type="checkbox"/> separate signed power of attorney 2. <input type="checkbox"/> copy of general power of attorney 3. <input type="checkbox"/> statement explaining lack of signature 4. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 5. <input checked="" type="checkbox"/> fee calculation sheet 6. <input type="checkbox"/> separate indications concerning deposited microorganisms 7. <input type="checkbox"/> nucleotide and/or amino acid sequence listing (diskette) 8. <input checked="" type="checkbox"/> other (specify): Copy of Official Action |

Figure No. 1 of the drawings (if any) should accompany the abstract when it is published.

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

KOLSTER OY AB

by

Antti Peltonen

| | | | |
|---|--------------------------|---|--|
| For receiving Office use only | | | |
| 1. Date of actual receipt of the purported international application: | 20 MAY 1997 (20-05-1997) | | |
| 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: | | | |
| 4. Date of timely receipt of the required corrections under PCT Article 11(2): | | | |
| 5. International Searching Authority specified by the applicant: | ISA / SE | 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid | 2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received: |

| | | | |
|---|--------------|--|--------------|
| For International Bureau use only | | | |
| Date of receipt of the record copy by the International Bureau: | 10 JUNE 1997 | | (10.06.97) |

Menetelmä tilaajan identiteetin siirtämiseksi matkaviestinjärjestelmässä**Keksinnön soveltamisala**

5 Keksintö koskee menetelmää kutsuvan tilaajan (A-tilaajan) identiteetin välittämiseksi kutsutulle tilaajalle (B-tilaajalle) matkaviestinjärjestelmässä, joka käsitteää kotirekisterin verkkoon rekisteröityjen matkaviestimien tilaajatietojen säilyttämiseksi pysyvästi ja ainakin yhden 10 vierailijarekisterin, jossa säilytetään vierailijarekisterin valvomalla maantieteellisellä alueella sijaitsevien matkaviestimien tilaajatietoja väliaikaisesti, jolloin matkaviestinjärjestelmän keskusten ja rekisterien välillä lähetetään puheyhteydestä riippumatonta merkinantoliiken- 15 nettä.

Lisäksi eksintö koskee matkaviestinjärjestelmää, joka käsitteää kotirekisterin verkkoon rekisteröityjen matkaviestimien tilaajatietojen säilyttämiseksi pysyvästi ja ainakin yhden vierailijarekisterin, jossa säilytetään vierailijarekisterin valvomalla maantieteellisellä alueella sijaitsevien matkaviestimien tilaajatietoja väliaikaisesti. Matkaviestinjärjestelmän keskusten ja rekisterien välillä lähetetään puheyhteydestä riippumatonta merkinantoliikennettä.

Keksinnön taustaa

Nykyiset matkaviestinjärjestelmät tarjoavat yleensä palveluna kutsuvan tilaajan (A-tilaajan) identiteetin ilmoittamisen kutsutulle tilaajalle (B-tilaajalle) puhelunmuodostuksen yhteydessä. Toiminteen ansiosta B-tilaaja 30 tunnistaa soittajan jo ennen puheluun vastaanusta.

Oheisen piirustuksen kuviot havainnollistaa matkaviestimelle MS_B päätyvän puhelun muodostusta GSM-tyyppisessä matkaviestinjärjestelmässä. Kuviossa on esitetty vain puhelunmuodostussignaloinnin kannalta oleelliset verkkon elementit. Kohdassa 1 A-tilaajan käynnistämä puhelu

reititetään A-tilaajan verkosta, joka voi olla esimerkiksi matkaviestinverkko PLMN tai yleinen puhelinverkko PSTN, B-tilaajan PLMN-kotiverkon kauttakulkukeskukseen GMSC, joka lähettää B-tilaajan kotirekisteriin HLR reititystietojen 5 kyselyn (sanoma 2). Matkaviestimen MS tilaaajatiedot on tallennettuna pysyvästi kotirekisteriin HLR ja väliaikaisesti siihen vierailijarekisteriin VLR, jonka alueella matkaviestin MS kulloinkin sijaitsee. Sijainnin päivitykseenä B-tilaajan kotirekisteriin HLR on päivitetty tieto 10 siitä, minkä vierailijarekisterin VLR alueella B-tilaaja sijaitsee. Kuvion 1 esimerkissä B-tilaaja on toisessa matkaviestinverkkossa PLMN. Kohdassa 3 kotirekisteri HLR lähetää B-tilaajan vierailijarekisterille VLR vierailtavaan PLMN-verkkoon vaellusnumeropyynnön. Vierailijarekisteri 15 VLR varaa vaellusnumeron MSRN (Mobile Station Roaming Number) ja lähetää numeron kotirekisterille HLR vastaus- sanomassa 4. Kotirekisteri HLR välittää vaellusnumeron edelleen reititystietoja kysyneelle koti-PLMN:n kauttakulkukselle GMSC sanomassa 5. Tämän jälkeen kauttakulku- 20 keskus GMSC voi vaellusnumeron perusteella reitittää puhe- lun eteenpäin B-tilaajan matkaviestinkeskuselle MSC vie- railtavassa PLMN-verkkossa, tarvittaessa välittävän trans- sit-verkon kautta, kuten kuviossa 1, puhelunmuodostus- sanomalla 6. Puhelunmuodostussanoman 6 kutsuvan tilaajan 25 identiteettikentässä CLI (Calling Line Identity) välite- tään B-tilaajalle tieto A-tilaajan identiteetistä. Edellä kuvatun kaltainen kutsuvan tilaajan identiteetin siirto ei aina onnistu, esimerkiksi kun B-tilaaja sijaitsee toisen PLMN:n alueella, kuten kuviossa 1. Vaikka puhelunmuodostus 30 eri verkkojen välillä on mahdollista, kaikki verkot eivät tue kutsuvan tilaajan identiteetin siirtoon käytettävää verkkomerkinantoa. Tällöin kutsutulle tilaajalle ilmoite- taan suosituksen GSM 02.81 kohdan 1.4 (version 4.4.1) mu- kaisesti, että kutsuvan tilaajan identiteetti CLI ei ole 35 saatavilla.

Keksinnön lyhyt selostus

Tämän keksinnön tarkoituksesta on mahdollistaa kutsuvan tilaajan identiteetin siirto B-tilaajalle myös silloin, kun puhelunmuodostus ei tue kutsuvan tilaajan identiteetin siirtoa, esimerkiksi koska B-tilaaja sijaitsee toisen verkon alueella.

Tämä uudentyyppinen A-tilaajan tunnistetiedon välitys saavutetaan keksinnön mukaisella menetelmällä, jolle on tunnusomaista, että A-tilaajan tunnistetieto välitetään B-tilaajan matkaviestinkeskukselle puheyhteydestä riippumattoman merkinannon välityksellä.

10 Keksintö koskee myös johdannossa esitetyn tyyppistä matkaviestinjärjestelmää, jolle on keksinnön mukaisesti tunnusomaista, että se on sovitettu välittämään A-tilaajan tunnistetiedon B-tilaajan matkaviestinkeskukselle puheyhteydestä riippumattoman merkinannon välityksellä.

15 Keksintö perustuu siihen ajatukseen, että tilaajan identiteetti siirretään matkaviestinjärjestelmän keskusten ja rekisterien välisessä signaaliiliikenteessä, edullisesti ennen puhelun kytkeytymistä.

Tällaisen A-tilaajan identiteetin siirtomenetelmän etuna on se, että A-tilaajan identiteetti pystytään välittämään B-tilaajalle riippumatta puhelunmuodostukseen käytettävien verkkojen merkinantoprotokollasta.

20 Keksinnön etuna on edelleen se, että A-tilaajan identiteetti voidaan välittää B-tilaajalle toisen verkon alueelle, esimerkiksi ulkomaille.

Kuvioluettelo

Keksintöä selitetään lähemmin seuraavassa viitaten 30 oheisiin piirustuksiin, joissa

kuvio 1 havainnollistaa puhelunmuodostusta GSM-järjestelmässä ja

kuvio 2 esittää keksinnön mukaisen menetelmän A-tilaajan identiteetin CLI välitystä puhelunmuodostuksessa.

Keksinnön yksityiskohtainen selostus

Esillä olevaa keksintöä voidaan soveltaa minkä tahansa matkaviestinjärjestelmän yhteydessä. Jäljempänä keksintöä on lähemmin selostettu esimerkinomaisesti yleisurooppalaisen digitaalisen matkaviestinjärjestelmän GSM yhteydessä. GSM-järjestelmän tarkemman kuvauksen osalta viitataan GSM-suosituksiin sekä kirjaan "The GSM System for Mobile Communications", M. Mouly & M. Pautet, Palaiseau, France, 1992, ISBN:2-9507190-0-7.

10 Kuvio 1 havainnollistaa puhelun muodostukseen liittyvää signalointia, jota on aiemmin selostettu tekniikan tason mukaisen puhelunmuodostuksen yhteydessä. Seuraavassa keksintöä on tarkemmin selostettu ensisijaisen suoritusmuodon valossa kuvioon 1 viitaten. Tässä suoritusmuodossa A-tilaajan identiteetin välitys liittyy kuvion 1 sanomaan 3. GSM-järjestelmän MAP-signaloointia käyttäen kotirekisteri HLR lähettää vierailijarekisterille VLR vaellusnumero-pyynnön PROVIDE_ROAMING_NUMBER -sanomalla..Keksinnön ensisijaisessa suoritusmuodossa PROVIDE_ROAMING_NUMBER -sanomaaan lisätään kutsuvan tilaajan tunnistetieto, esimerkiksi puhelinnumero tai ISDN-numero, jonka perusteella A-tilaaja on tunnistettavissa. Muiden kuvion 1 sanomien osalta keksinnön mukaista menetelmää hyödyntävän matkaviestinjärjestelmän puhelunmuodostus on aiemmin kuvatun tekniikan tason kaltainen.

30 Kuvio 2 havainnollistaa keksinnön ensisijaisen suoritusmuodon mukaista kutsuvan tilaajan identiteettitiedon CLI välitystä puhelunmuodostuksessa. Kutsuva tilaaja (A-tilaaja) ilmoittaa identiteettinsä käynnistääseen puhe-lua. Kohdassa 1 tämä tieto välitetään B-tilaajan PLMN-kotiverkon kauttakulkukeskukselle GMSC ennalta tunnetulla tavalla. Kohdassa 2 kauttakulkukeskus GMSC välittää tämän CLI-tiedon edelleen B-tilaajan kotirekisterille HLR esimerkiksi reititystietojen kyselyn yhteydessä. Kohdan 3 vaellusnumeropyynnön PROVIDE_ROAMING_NUMBER -sanoma välit-

tää CLI:n keksinnön mukaisesti kotirekisteriltä HLR vierailijarekisterille VLR, joka tallentaa CLI-tiedon. Tekniikan tason mukaisesti vierailijarekisteri VLR vastaa vaellusnumeropyyntöön allokoimalla puhelulle vaellusnumeron MSRN ja lähettämällä sen kotirekisterille HLR (kohta 4), joka välittää vaellusnumeron edelleen kauttakulkukeskukselle GMSC puhelun reititystä varten (kohta 5). Kun puhelunmuodostussanoma 6 saapuu kauttakulkukeskuksesta GMSC mahdollisesti yleisen televerkon tai muun transit-verkon 10 kautta B-tilaajan matkaviestinkeskukseen MSC vierailtavassa PLMN-verkossa, tekee matkaviestinkeskus MSC vierailijarekisteriin VLR tilaajatietokyselyn ja saa vastauksessa muiden tietojen lisäksi A-tilaajan identiteettitiedon. Matkaviestinkeskus MSC välittää A-tilaajan identiteetin B-tilaajalle tunnetulla tavalla.

Edellä on esimerkinomaisesti selitetty keksintöä kuvioihin 1 ja 2 viitaten puhelunmuodostuksen tapahtuessa B-tilaajan kotiverkon kauttakulkukeskuksen GMSC kautta. Kun A-tilaaja sijaitsee samassa verkossa B-tilaajan kotirekisterin HLR kanssa, ei puhelua tarvitse reitittää B-tilaajan kauttakulkukeskuksen GMSC kautta. Kuvioon 1 merkittyä kauttakulkukeskusta GMSC ei tarvita myös käään, kun A-tilaajan keskus tai A-tilaajan verkon kauttakulkukeskus pystyy suoraan tiedonvälitykseen B-tilaajan kotirekisterin 20 kanssa. Tällöin A-tilaajan käynnistämää puhelua ei tarvitse siirtää kauttakulkukeskukselle GMSC, vaan A-tilaajan keskus, esimerkiksi matkaviestinkeskus, tai A-tilaajan verkon kauttakulkukeskus lähetää reititystietokyselyn suoraan B-tilaajan kotirekisterille HLR (kuvion 1 sanoma 25 2'). Kotirekisteri HLR lähetää vierailijarekisterille VLR vaellusnumeropyynnön keksinnön aiemmin selostetun suoritusmuodon mukaisesti välittääen A-tilaajan identiteetin sanomassa 3. Vastaussanomassa 4 kotirekisteri HLR saa vaellusnumeron MSRN aiemmin selostetun puhelunmuodostus-35 signaloinnin mukaisesti. Kotirekisteri HLR lähetää A-til-

laajan keskukselle tai A-tilaajan verkon kauttakulkukeskukselle vierailijarekisterin VLR varaaman vaellusnumerona MSRN kuvion 1 sanomassa 5', jonka saatuaan A-tilaajan keskus tai A-tilaajan kauttakulkukeskus reitittää puhelun B-tilaajan matkaviestinkeskuselle mahdollisesti transit--verkon kautta.

Esillä olevan keksinnön mukainen A-tilaajan identiteetin välittäminen soveltuu käytettäväksi myös silloin, kun sekä A-tilaaja että B-tilaaja sijaitsevat B-tilaajan 10 koti-PLMN:ssä. Edellytyksenä keksinnön mukaisen menetelmän käyttämiselle on, että A-tilaajan tunnistetieto CLI on siirretty B-tilaajan kotirekisteriin HLR.

Piirustukset ja niihin liittyvä selitys on tarkoitettu vain havainnollistamaan keksinnön ajatusta. Yksityiskohdiltaan voi keksinnön mukainen matkaviestinjärjestelmä ja menetelmä A-tilaajan identiteetin välittämiseksi vaihdella patenttivaatimusten puitteissa. Vaikka keksintöä onkin edellä selitetty lähinnä MAP-signaloinnin yhteydessä, voidaan menetelmä toteuttaa muunkinlaista matkaviestinjärjestelmän keskusten ja rekisterien välistä merkinantoa hyväksikäytäen.

Patenttivaatimukset

1. Menetelmä kutsuvan tilaajan (A-tilaajan) identiteetin välittämiseksi kutsutulle tilaajalle (B-tilaajalle) matkaviestinjärjestelmässä, joka käsitteää kotirekisterin (HLR) verkkoon rekisteröityjen matkaviestimien (MS) tilaajatietojen säilyttämiseksi pysyvästi ja ainakin yhden vierailijarekisterin (VLR), jossa säilytetään vierailijarekisterin (VLR) valvomalla maantieteellisellä alueella sijaitsevien matkaviestimien (MS) tilaajatietoja väliaikaisesti, jolloin matkaviestinjärjestelmän keskusten (GMSC, MSC) ja rekisterien (HLR, VLR) välillä lähetetään puheyhteydestä riippumatonta merkinantoliikennettä, t u n n e t t u s iitää, että A-tilaajan tunnistetieto välitetään B-tilaajan matkaviestinkeskuselle (MSC) puheyhteydestä riippumattoman merkinannon välityksellä.

2. Patenttivaatimuksen 1 mukainen menetelmä, t u n n e t t u s iitää, että A-tilaajan tunnistetieto välitetään ennen puhelun kytkentää.

3. Patenttivaatimuksen 1 tai 2 mukainen menetelmä, t u n n e t t u s iitää, että kotirekisteri (HLR) lähettää vierailijarekisterille (VLR) reititystietopyynnön yhteydessä A-tilaajan tunnistetiedon.

4. Patenttivaatimuksen 3 mukainen menetelmä, t u n n e t t u s iitää, että A-tilaajan tunnistetieto lähetetään MAP PROVIDE_ROAMING_NUMBER -sanomassa.

5. Jonkin edellisen patenttivaatimuksen mukainen menetelmä, t u n n e t t u s iitää, että B-tilaaja sijaitsee vieraassa verkossa.

6. Matkaviestinjärjestelmä, joka käsitteää kotirekisterin (HLR) verkkoon rekisteröityjen matkaviestimien (MS) tilaajatietojen säilyttämiseksi pysyvästi ja ainakin yhden vierailijarekisterin (VLR), jossa säilytetään vierailijarekisterin (VLR) valvomalla maantieteellisellä alueella sijaitsevien matkaviestimien (MS) tilaajatietoja vä-

liaikaisesti, jolloin matkaviestinjärjestelmän keskusten (GMSC, MSC) ja rekisterien (HLR, VLR) välillä lähetetään puheyhteydestä riippumatonta merkinantoliikennettä, t u n-
n e t t u siitä, että matkaviestinjärjestelmä on sovitettu
5 välittämään A-tilaajan tunnistetiedon B-tilaajan matkaviestinkeskuselle (MSC) puheyhteydestä riippumattoman merkinannon välityksellä.

7. Patenttivaatimuksen 6 mukainen matkaviestinjärjestelmä, t u n n e t t u siitä, että kotirekisteri (HLR)
10 on sovitettu lähettämään vierailijarekisterille (VLR) reititystietopyynnön yhteydessä A-tilaajan tunnistetiedon.

8. Patenttivaatimuksen 7 mukainen matkaviestinjärjestelmä, t u n n e t t u siitä, että kotirekisteri (HLR)
on sovitettu lähettämään A-tilaajan tunnistetiedon MAP
15 PROVIDE_ROAMING_NUMBER -sanomassa.

9. Patenttivaatimuksen 6, 7 tai 8 mukainen matkaviestinjärjestelmä, t u n n e t t u siitä, että B-tilaaja
sijaitsee vieraassa verkossa.

Tiivistelmä (57)

Keksinnön kohteena on menetelmä ja matkaviestinjärjestelmä kutsuvan tilaajan (A-tilaajan) identiteetin välittämiseksi kutsuttulle tilaajalle (B-tilaajalle) matkaviestinjärjestelmässä, joka käsittää kotirekisterin (HLR) verkkoon rekisteröityjen matkaviestimien (MS) tilaajatietojen säilyttämiseksi pysyvästi ja ainakin yhden vierailijarekisterin (VLR), jossa säilytetään vierailijarekisterin (VLR) valvomalla maantieteellisellä alueella sijaitsevien matkaviestimien (MS) tilaajatietoja väliaikaisesti. Matkaviestinjärjestelmän keskusten (GMSC, MSC) ja rekisterien (HLR, VLR) välillä lähetetään puheyhteydestä riippumaton merkinantoliikennettä. Keksinnölle on tunnusomaista, että A-tilaajan tunnistetieto välitetään B-tilaajan matkaviestinkeskukseen (MSC) puheyhteydestä riippumattoman merkinannon välityksellä.

(Kuvio 1)

Fig. 1

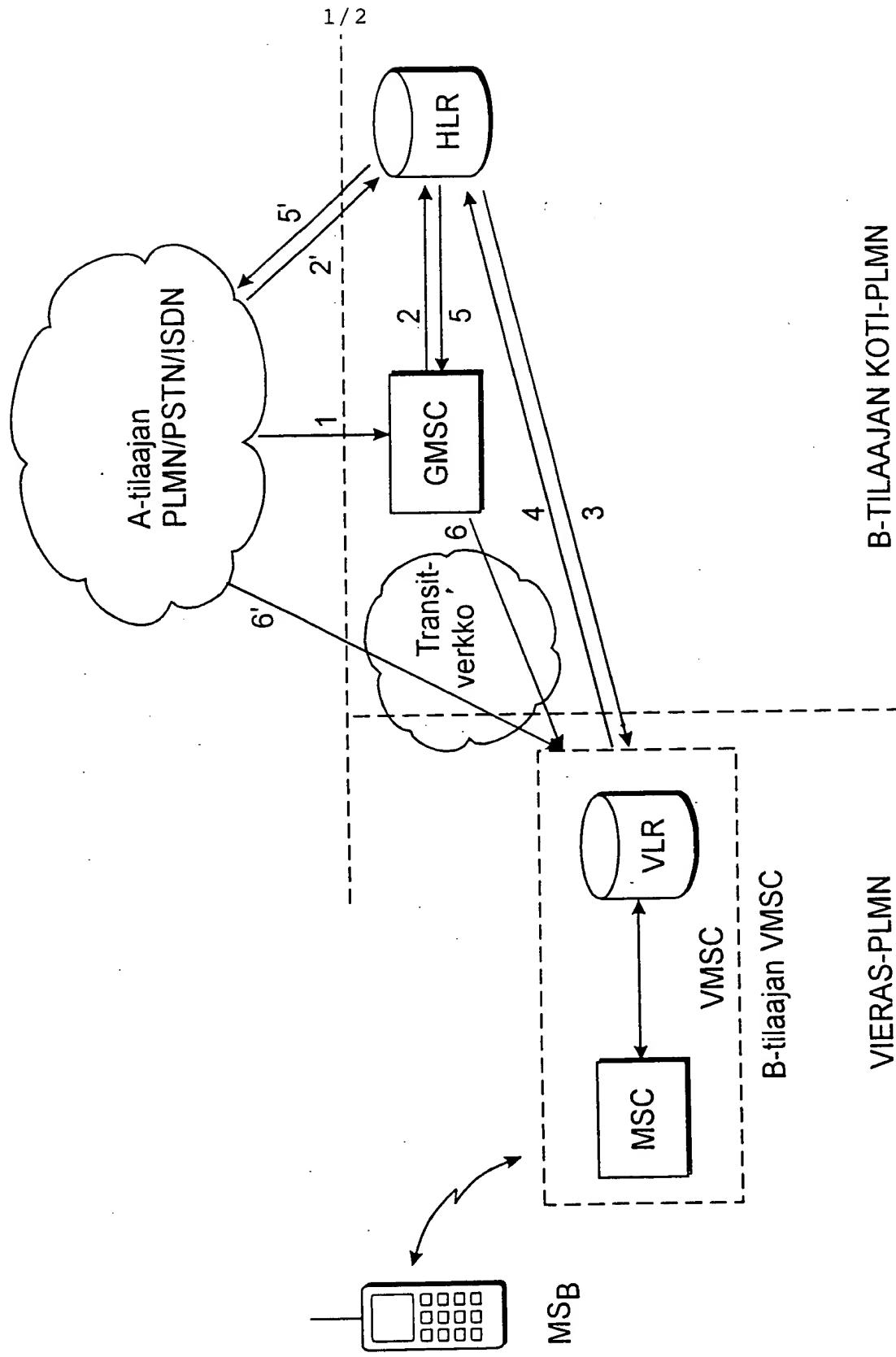
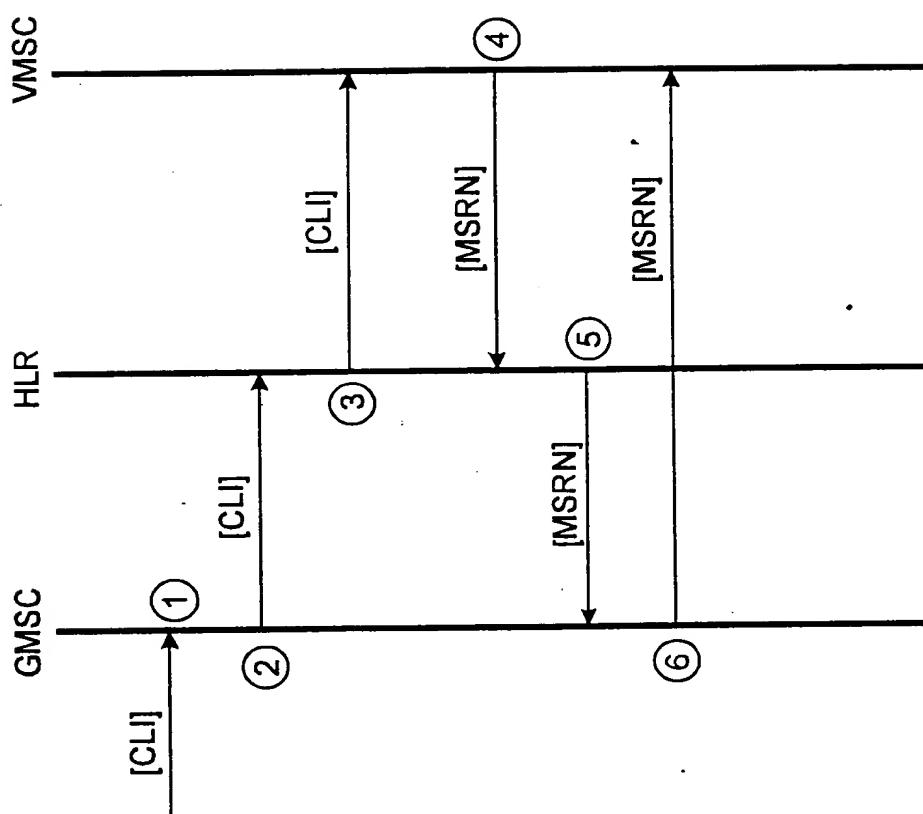


Fig. 2



INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00298

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 7/38, H04M 1/57

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04M, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CLAIMS, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
| A | WO 9421090 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 15 Sept 1994 (15.09.94), see the whole document. --- | 1,6 |
| P,A | JP 8154263 A (KAWAMOTO HIROSHI), 25 November 1994 (25.11.94) ----- | ,1,6 |

 Further documents are listed in the continuation of Box C. See patent family annex.

- * Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

4 Sept 1997

11-09- 1997

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. + 46 8 666 02 86Authorized officer

Bo Gustavsson
Telephone No. + 46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

06/08/97

International application No.

PCT/FI 97/00298

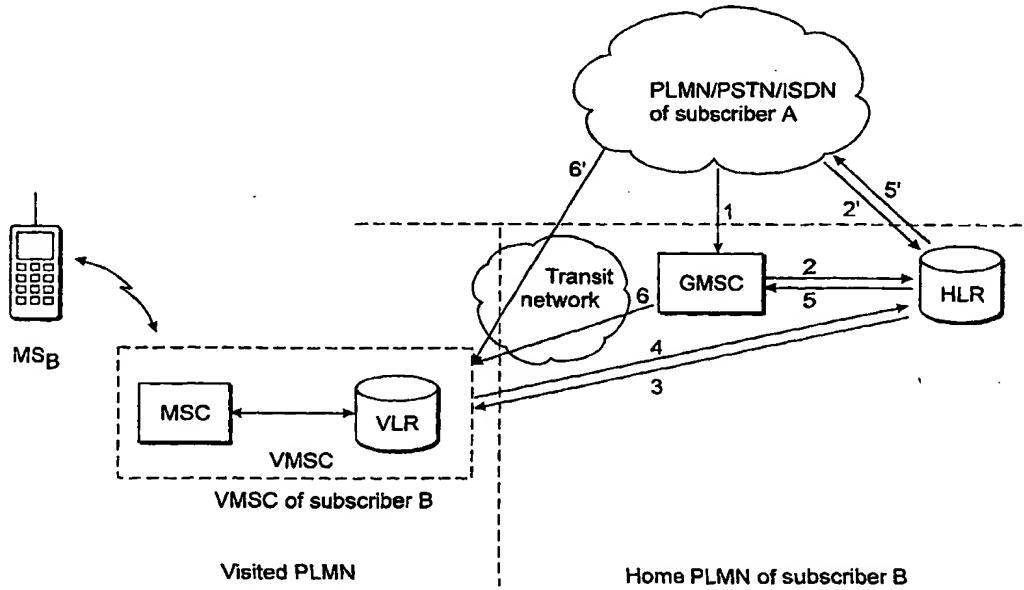
| Patent document cited in search report | Publication date | Patent family member(s) | | Publication date |
|--|------------------|-------------------------|---|------------------|
| WO 9421090 A1 | 15/09/94 | AU 672293 | B | 26/09/96 |
| | | AU 6223294 | A | 26/09/94 |
| | | CN 1103541 | A | 07/06/95 |
| | | EP 0647384 | A | 12/04/95 |
| | | EP 0659228 | A | 28/06/95 |
| | | FI 945185 | A | 03/11/94 |
| | | JP 7506710 | T | 20/07/95 |
| | | NO 950837 | A | 03/03/95 |
| | | SE 501009 | C | 17/10/94 |
| | | SE 9300721 | A | 05/09/94 |
| | | US 5467381 | A | 14/11/95 |
| JP 8154263 A | 25/11/94 | NONE | | |



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| | | | |
|---|--|--|--|
| (51) International Patent Classification 6 : H04Q 7/38, H04M 1/57 | | A1 | (11) International Publication Number: WO 97/44981 (43) International Publication Date: 27 November 1997 (27.11.97) |
| <p>(21) International Application Number: PCT/FI97/00298</p> <p>(22) International Filing Date: 20 May 1997 (20.05.97)</p> <p>(30) Priority Data: 962128 ✓ 20 May 1996 (20.05.96) FI</p> <p>(71) Applicant (for all designated States except US): NOKIA TELECOMMUNICATIONS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).</p> <p>(72) Inventor; and</p> <p>(75) Inventor/Applicant (for US only): HUOTARI, Seppo [FI/FI]; Harakankuja 6 E 33, FIN-02600 Espoo (FI).</p> <p>(74) Agent: KOLSTER OY AB; Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).</p> | | <p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. In English translation (filed in Swedish).</p> | |

(54) Title: TRANSMITTING SUBSCRIBER IDENTITY IN MOBILE COMMUNICATION SYSTEM



(57) Abstract

The invention relates to a method and a mobile communication system for transmitting the identity of a calling subscriber (subscriber A) to a called subscriber (subscriber B) in a mobile communication system comprising a home location register (HLR) for permanent storage of subscriber data on mobile stations (MS) registered in the network, and at least one visitor location register (VLR) for temporary storage of subscriber data on mobile stations (MS) located in the geographical area monitored by the visitor location register (VLR). The invention is characterized in that the identity of subscriber A is transmitted to the mobile services switching centre (MSC) of subscriber B via signalling that is unrelated to the speech connection.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

| | | | | | | | |
|----|--------------------------|----|--|----|--|----|--------------------------|
| AL | Albania | ES | Spain | LS | Lesotho | SI | Slovenia |
| AM | Armenia | FI | Finland | LT | Lithuania | SK | Slovakia |
| AT | Austria | FR | France | LU | Luxembourg | SN | Senegal |
| AU | Australia | GA | Gabon | LV | Latvia | SZ | Swaziland |
| AZ | Azerbaijan | GB | United Kingdom | MC | Monaco | TD | Chad |
| BA | Bosnia and Herzegovina | GE | Georgia | MD | Republic of Moldova | TG | Togo |
| BB | Barbados | GH | Ghana | MG | Madagascar | TJ | Tajikistan |
| BE | Belgium | GN | Guinea | MK | The former Yugoslav Republic of Macedonia | TM | Turkmenistan |
| BF | Burkina Faso | GR | Greece | ML | Mali | TR | Turkey |
| BG | Bulgaria | HU | Hungary | MN | Mongolia | TT | Trinidad and Tobago |
| BJ | Benin | IE | Ireland | MR | Mauritania | UA | Ukraine |
| BR | Brazil | IL | Israel | MW | Malawi | UG | Uganda |
| BY | Belarus | IS | Iceland | MX | Mexico | US | United States of America |
| CA | Canada | IT | Italy | NE | Niger | UZ | Uzbekistan |
| CF | Central African Republic | JP | Japan | NL | Netherlands | VN | Viet Nam |
| CG | Congo | KE | Kenya | NO | Norway | YU | Yugoslavia |
| CH | Switzerland | KG | Kyrgyzstan | NZ | New Zealand | ZW | Zimbabwe |
| CI | Côte d'Ivoire | KP | Democratic People's Republic of Korea | PL | Poland | | |
| CM | Cameroon | KR | Republic of Korea | PT | Portugal | | |
| CN | China | KZ | Kazakhstan | RO | Romania | | |
| CU | Cuba | LC | Saint Lucia | RU | Russian Federation | | |
| CZ | Czech Republic | LI | Liechtenstein | SD | Sudan | | |
| DE | Germany | LK | Sri Lanka | SE | Sweden | | |
| DK | Denmark | LR | Liberia | SG | Singapore | | |
| EE | Estonia | | | | | | |

TRANSMITTING SUBSCRIBER IDENTITY IN MOBILE COMMUNICATION SYSTEM

FIELD OF THE INVENTION

The invention relates to a method of transmitting the identity of a calling subscriber (subscriber A) to a called subscriber (subscriber B) in a mobile communication system comprising a home location register for permanent storage of subscriber data on mobile stations registered in the network, and at least one visitor location register for temporary storage of subscriber data on mobile stations located in the geographical area monitored by the visitor location register, whereby signalling that is unrelated to the speech connection is transmitted between the switching centres and registers of the mobile communication system.

The invention further relates to a mobile communication system comprising a home location register for permanent storage of subscriber data on mobile stations registered in the network, and at least one visitor location register for temporary storage of subscriber data on mobile stations located in the geographical area monitored by the visitor location register. Signalling that is unrelated to the speech connection is transmitted between the switching centres and registers of the mobile communication system.

BACKGROUND OF THE INVENTION

A service usually offered by present mobile communication systems is notification of the identity of the calling subscriber (subscriber A) to the called subscriber (subscriber B) during call set-up. This enables subscriber B to identify the caller before answering the call.

Figure 1 in the attached drawing illustrates mobile MS_B terminating call set-up in a GSM-type mobile communication system. The Figure only shows the relevant network elements as far as call set-up signalling is concerned. At point 1 a call initiated by subscriber A is routed from the network of subscriber A (e.g. a mobile communication system PLMN or a public telephone network PSTN) to the Gateway MSC (GMSC) of the PLMN home network of subscriber B. The GMSC transmits an inquiry (message 2) about routing information to the home location register HLR of subscriber B. The subscriber data on the mobile station MS is permanently stored in the home location register HLR and temporarily in the visitor location register VLR in whose area the mobile station MS is located. During location update, informa-

tion on the visitor location register VLR in whose area subscriber B is located is updated to the home location register HLR of subscriber B. In the example of Figure 1, subscriber B is located in another mobile communication network PLMN. At point 3, the home location register HLR transmits to the visitor location register VLR of subscriber B a request for a roaming number to the PLMN network to be visited. The visitor location register VLR reserves a Mobile Station Roaming Number (MSRN) and transmits the number to the home location register HLR in a reply message 4. The home location register HLR forwards the roaming number in message 5 to the GMSC of the home PLMN which inquired about the routing information. On the basis of the roaming number, the GMSC can then route the call to the mobile services switching centre MSC of subscriber B in the PLMN network visited, if necessary via a transmitting transit network, as in Figure 1, in a set-up message 6. Information on the identity of subscriber A is transmitted to subscriber B in a Calling Line Identity (CLI) field of the set-up message 6. The above kind of transmission of the calling subscriber identity is not always successful, e.g. when subscriber B is located in the area of another PLMN, as in Figure 1. Although call set-up is possible between different networks, all networks do not support the network signalling used in the transmission of the calling subscriber identity. In these cases the called subscriber is notified, in accordance with point 1.4 (version 4.4.1) of the recommendation GSM 02.81, that the CLI is not available.

BRIEF DESCRIPTION OF THE INVENTION

It is an object of the present invention to enable transmission of the identity of a calling subscriber to subscriber B even if call set-up does not support transmission of calling subscriber identity, e.g. because subscriber B is located in the area of another network.

This new type of transmission of the identity of subscriber A is achieved with the method of the invention, which is characterized that the identity of subscriber A is transmitted to the mobile services switching centre of subscriber B via signalling that is unrelated to the speech connection.

The invention further relates to a mobile communication system described in the preamble, which, according to the invention, is characterized in that it is arranged to transmit the identity of subscriber A to the mobile services switching centre of subscriber B via signalling that is unrelated to the speech connection.

The invention is based on the idea that the subscriber identity is transmitted in signalling traffic between the switching centres and registers of the mobile communication system, preferably before a call is established.

- 5 The advantage of such a method for transmission of the identity of subscriber A is that the identity of subscriber A can be transmitted to subscriber B irrespective of the signalling protocols of the networks used for call set-up.

- 10 A further advantage of the invention is that the identity of subscriber A can be transmitted to subscriber B to the area of another network, e.g. abroad.

LIST OF DRAWINGS

In the following the invention will be described in greater detail with reference to the accompanying drawings, in which

- 15 Figure 1 illustrates call set-up in a GSM system, and
Figure 2 shows transmission of subscriber A identity CLI according to the method of the invention.

DETAILED DESCRIPTION OF THE INVENTION

- 20 The present invention can be applied to any mobile communication system. By way of example, the invention will be described below in connection with the pan-European digital mobile communication system GSM. As to a more detailed description of the GSM system, reference is made to GSM recommendations and the publication "The GSM System for Mobile Communications", M. Mouly & M. Pautet, Palaiseau, France, 1992, ISBN:2-9507190-0-7.

- 25 Figure 1 illustrates signalling associated with call set-up, previously described in connection with state-of-the-art call set-up. In the following the invention will be described in more detail by means of a preferred embodiment with reference to Figure 1. In this embodiment the transmission of subscriber A identity is associated with message 3 of Figure 1. Using MAP signalling of the GSM system, the home location register HLR transmits a roaming number request by a PROVIDE_ROAMING_NUMBER message to the visitor location register VLR. In the preferred embodiment of the invention, the identity of the calling subscriber, e.g. the phone number or the ISDN number, is added to the PROVIDE_ROAMING_NUMBER message, thus enabling identification of subscriber A. As to the other messages of Figure 1, call set-up in a mobile communication system utilizing the method of the invention conforms with the
- 30
- 35

above described state-of-the-art technique.

Figure 2 illustrates the transmission of the CLI under call set-up according to the preferred embodiment of the invention. The calling subscriber (subscriber A) states his/her identity when initiating a call. At point 1 this information is forwarded via the PLMN home network of subscriber B to the GMSC in a manner known per se. At point 2 the GMSC forwards the CLI to the home location register HLR of subscriber B, e.g. in connection with the inquiry about routing information. In accordance with the invention, at point 3 the PROVIDE_ROAMING_NUMBER message of the request for a roaming number 5 forwards the CLI from the home location register HLR to the visitor location register VLR, which stores the CLI. In accordance with prior art, the visitor location register VLR answers the request for a roaming number by allocating a roaming number MSRN to the call and by transmitting it to the home location register HLR (point 4), which forwards the roaming number to the GMSC for 10 routing of the call (point 5). Once the set-up message 6 arrives from the GMSC, possibly via a public telephone network or another transit network to the mobile services switching centre MSC of subscriber B in the PLMN network being visited, the MSC makes an inquiry about subscriber data to the visitor location register VLR and receives in the answer, among other things, 15 the identity of subscriber A. The MSC forwards the identity of subscriber A to subscriber B in a manner known per se.

The invention has been described above by way of an example with reference to Figures 1 and 2, in a case when call set-up is carried out via the GMSC of the home network of subscriber B. When subscriber A is located in 25 the same network as the home location register HLR of subscriber B, the call does not have to be routed via the GMSC of subscriber B. Neither is there any need for the GMSC of Figure 1 if the switching centre of subscriber A or the gateway MSC of the network of subscriber A has the capacity to communicate directly with the home location register of subscriber B. In this case the call 30 initiated by subscriber A does not have to be transmitted to the GMSC, but instead the switching centre of subscriber A, e.g. a mobile services switching centre, or the gateway MSC of the network of subscriber A transmits the routing inquiry direct to the home location register HLR of subscriber B (message 2' in Figure 1). The home location register HLR transmits a roaming number 35 request to the visitor location register VLR in accordance with the above described embodiment of the invention by forwarding the identity of subscriber A

- in message 3. In a reply message 4 the home location register HLR gets a roaming number MSRN in accordance with the set-up signalling described above. The home location register HLR transmits to the switching centre of subscriber A or the network gateway MSC of subscriber A the roaming number
- 5 MSRN reserved by the visitor location register VLR in message 5' of Figure 1. Having received this message, the switching centre or the network gateway MSC of subscriber A routes the call to the mobile services switching centre of subscriber B, possibly via a transit network.

Transmission of the identity of subscriber A according to the present
10 invention is also applicable when both subscriber A and subscriber B are located in the home PLMN of subscriber B. A prerequisite for the use of the method of the invention is that the CLI has been transmitted to the home location register HLR of subscriber B.

The drawings and the description related thereto are only intended
15 to illustrate the idea of the invention. The details of the mobile communication system and the method for transmitting the identity of subscriber A of the invention may vary within the scope of the claims. Even though the invention has been described above mainly in connection with MAP signalling, the method can be realized by utilising other kinds of signalling between the mobile services switching centres and registers of a mobile communication system.

CLAIMS

1. A method of transmitting the identity of a calling subscriber (subscriber A) to a called subscriber (subscriber B) in a mobile communication system comprising a home location register (HLR) for permanent storage of subscriber data on mobile stations (MS) registered in the network, and at least one visitor location register (VLR) for temporary storage of subscriber data on mobile stations (MS) located in the geographical area monitored by the visitor location register, whereby signalling that is unrelated to the speech connection is transmitted between the switching centres (GMSC, MSC) and registers (HLR, VLR) of the mobile communication system, **characterized** in that the identity of subscriber A is transmitted to the mobile services switching centre (MSC) of subscriber B via signalling that is unrelated to the speech connection.
2. A method as claimed in claim 1, **characterized** in that the identity of subscriber A is transmitted before call set-up.
3. A method as claimed in claim 1 or 2, **characterized** in that the home location register (HLR) transmits to the visitor location register (VLR) the identity of subscriber A in connection with a request for routing information.
4. A method as claimed in claim 3, **characterized** in that the identity of subscriber A is transmitted in a MAP PROVIDE_ROAMING_NUMBER message.
5. A method as claimed in any one of the preceding claims, **characterized** in that subscriber B is located in a visited network.
6. A mobile communication system comprising a home location register (HLR) for permanent storage of subscriber data on mobile stations (MS) registered in the network, and at least one visitor location register (VLR) for temporary storage of subscriber data on mobile stations (MS) located in the geographical area monitored by the visitor location register (VLR), whereby signalling that is unrelated to the speech connection is transmitted between the switching centres (GMSC, MSC) and registers (HLR, VLR) of the mobile communication system, **characterized** in that the mobile communication system is arranged to transmit the identity of subscriber A to the mobile services switching centre (MSC) of subscriber B via signalling that is unrelated to the speech connection.

7. A mobile communication system as claimed in claim 6, **characterized** in that the home location register (HLR) is arranged to transmit the identity of subscriber A to the visitor location register (VLR) in connection with a request for routing information.
- 5 8. A mobile communication system as claimed in claim 7, **characterized** in that the home location register (HLR) is arranged to transmit the identity of subscriber A in a MAP PROVIDE_ROAMING_NUMBER message.
9. A mobile communication system as claimed in claim 6, 7 or 8,
- 10 **characterized** in that subscriber B is located in a visited network.

Fig. 1

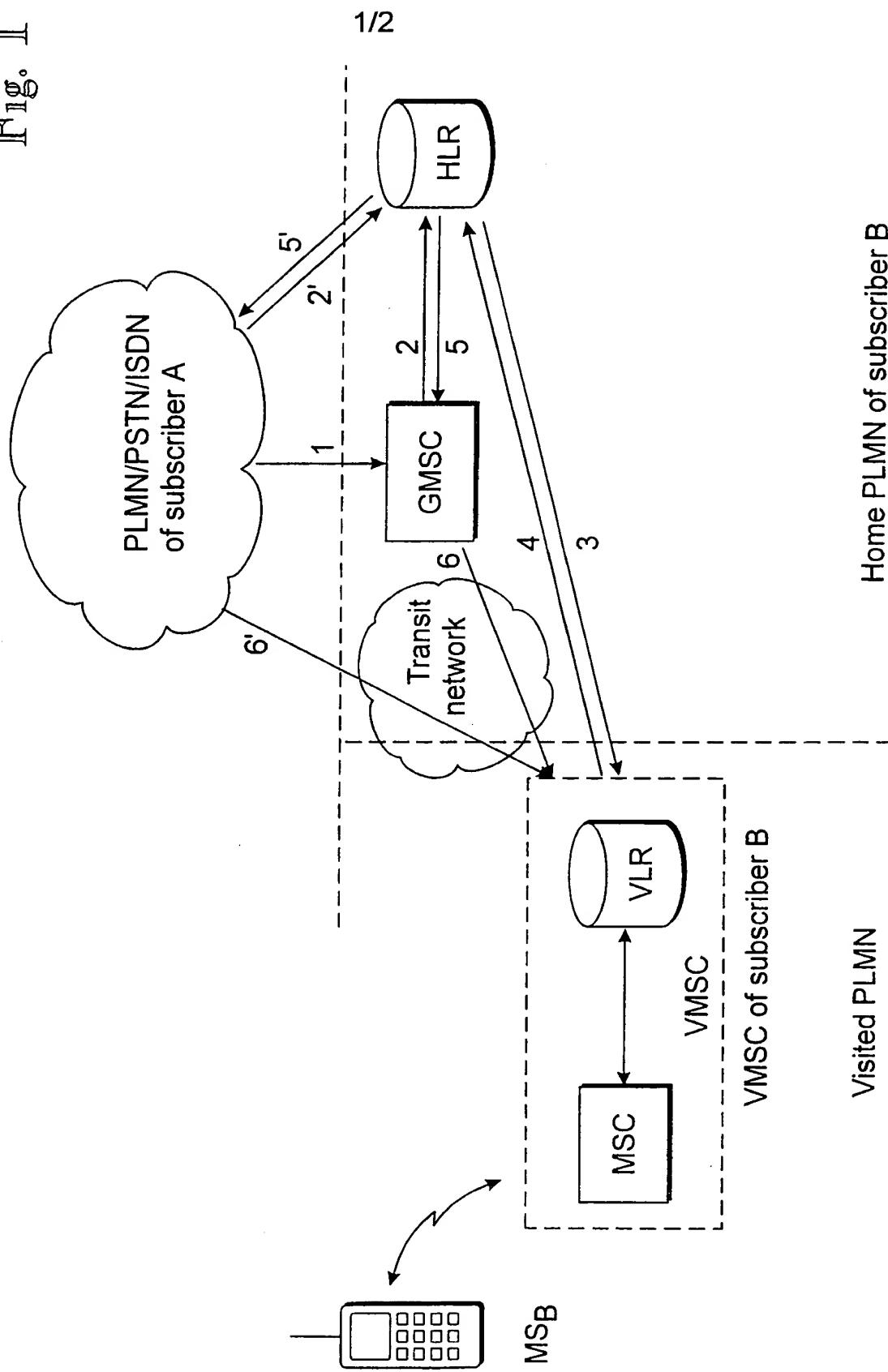
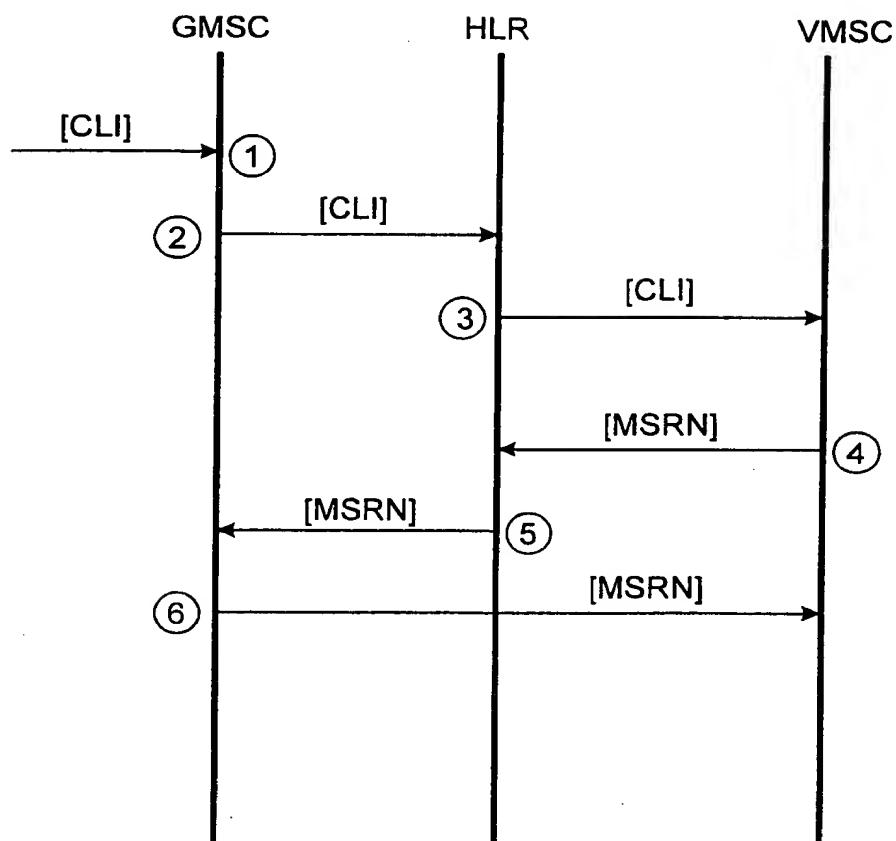


Fig. 2



INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00298

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 7/38, H04M 1/57

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04M, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CLAIMS, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A | WO 9421090 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 15 Sept 1994 (15.09.94), see the whole document. -- | 1,6 |
| P,A | JP 8154263 A (KAWAMOTO HIROSHI), 25 November 1994 (25.11.94) ----- | ,1,6 |

 Further documents are listed in the continuation of Box C. See patent family annex.

- * Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "B" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed
- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

4 Sept 1997

Date of mailing of the international search report

11-09-1997

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Bo Gustavsson
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

06/08/97

International application No.

PCT/FI 97/00298

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|--|--|
| WO 9421090 A1 | 15/09/94 | AU 672293 B AU 6223294 A CN 1103541 A EP 0647384 A EP 0659228 A FI 945185 A JP 7506710 T NO 950837 A SE 501009 C SE 9300721 A US 5467381 A | 26/09/96 26/09/94 07/06/95 12/04/95 28/06/95 03/11/94 20/07/95 03/03/95 17/10/94 05/09/94 14/11/95 |
| JP 8154263 A | 25/11/94 | NONE | |